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Should We Offer the Unemployed Places on Labour Market Programmes With the Intention That They Reject Them?

by

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Abstract

In this paper, we analyse the usage of labour market programmes using a matching model with three stocks – regular employment, labour market programmes, and unemployment. With the assumptions that a welfare safety net must be in place and that pay on labour market programmes must be at, or above, some minimum social level, we find that often the optimal policy for reducing unemployment in this model is to offer unemployed workers places on "rejectable" labour market programmes whilst simultaneously lowering the level of unemployment benefits, possibly to zero. ("Rejectable" labour market programmes are simply those programmes which are unacceptable to workers in that the expected lifetime income from remaining unemployed is higher than that of being on a programme.) The unemployed worker will thus still have a safety net in place, since the programme place offers a wage above the minimum level, but will reject it in favour of unemployment. This usage of labour market programmes is the only usage which is guaranteed free of crowding-out problems.

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1 Introduction

In recent years, there has been much debate on whether labour market programmes[1] can be used to combat unemployment, and their likely impact[2]. Various models have been developed to analyse the likely effects of such programmes on unemployment and the possibility of crowding out of regular employment. All of these models assume that if an unemployed individual is offered a place on a programme, they will accept it since it increases expected lifetime income. The general result of many of these models is that labour market programmes can reduce total unemployment but are likely to crowd out regular employment. These models also implicitly assume that benefits cannot be reduced below some minimum level unless a place on a programme is guaranteed. Thus it is assumed that the unemployed will have some welfare safety net to be able to fall back on, rather than being thrown into the ravages of destitution.

In this paper, we use a matching model in the tradition of Diamond (1981), Mortensen (1982), Pissarides (1985, 1990), and Holmlund & Lindén (1993). The major difference between this paper and the aforementioned papers is that we allow for the possibility of offering placements on labour market programmes which are unacceptable to the unemployed worker, in that the lifetime value to the worker of being unemployed is higher than if the said worker was on a labour market programme. We refer to these programmes as "rejectable" labour market programmes. (Note that it is always beneficial to the worker to accept a regular job.) This allows us to cut unemployment benefits and offer places on labour market programmes which are rejected in favour of remaining unemployed.

Since it is the unemployed who have the highest search intensity amongst those who are searching, due to having the time available to search, they have the highest chance of gaining a regular job. Thus a worker may prefer to be unemployed since they will have a higher chance of gaining a regular job. Due to the higher chance of gaining a regular job, it

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[1] "Labour market programmes" are simply those temporary measures which the government creates in an effort to alleviate unemployment. They include training programmes, temporary employment, etc.
[2] See, for example, Calmfors & Lang (1993), Holmlund & Lindén (1993), Jackman (1994), Layard, Nickell, & Jackman (1991), Miller (1991), and Miller (1995b).

is possible that a worker in unemployment will have a higher expected lifetime income than if that worker were on a labour market programme. Thus the value of being unemployed can be higher than the value of being on a programme. If we can construct a situation where it is in the interest of the worker to remain unemployed, despite lower unemployment benefits than previously (possibly no benefits whatsoever), then we can crowd in regular employment since the reduction in unemployment benefits will reduce the wage costs to firms and therefore lower the cost of maintaining a vacancy. Due to the lower cost of maintaining a vacancy, the number of vacancies will increase which will lead to more matches taking place between firms and workers. Thus we can gain a result where we have crowded in regular employment at the expense of unemployment, without removing the welfare safety net.

In this paper, we assume that those workers on labour market programmes are strictly less productive than those in regular employment. Thus, any crowding out of regular employment due to the usage of labour market programmes must be viewed with some caution. Also in this paper, we endogenise the payroll tax to make our analysis more complete. Whilst the endogenisation of the payroll tax does not affect the comparative statics of the model, it does allow us to see if the resulting situation is socially acceptable in that all members of the labour force are receiving a wage, or entitled to benefits, at or above some minimum level. Should this not be the case, then we consider the situation to be unworkable. For example, if we simply cut unemployment benefits to below the minimum social level without providing a guarantee of a place on a labour market programme with pay at or above the minimum level, then the situation would be considered socially unacceptable and therefore unworkable. The worker in unemployment would not have the protection of a welfare safety net, which is considered to be an essential element of any socially acceptable system. This would be despite the fact that the comparative statics would show an all round improvement.

This paper takes the following format: Firstly we develop our model, making the assumptions and framework explicit; then in Section 3 we look at the comparative statics of the model; in Section 4, we show how we have endogenised the payroll tax, and the motivation behind doing so; in Section 5, we undertake some simulations of examples of the usage of labour market programmes both for the rejectable and the "acceptable" (i.e. those labour market programmes which do increase the present value of a worker's lifetime income) cases and show the results; and lastly we provide a conclusion to this paper.

2 The model

In this paper, we use a matching model where the search process is summarised by an aggregate matching function $H = h(S,V)$, where S is the number of searchers and V is the number of vacancies. H is increasing in both its arguments and exhibits constant returns to scale. The number of searchers is given as the number of unemployed plus the effective number of searchers on labour market programmes, i.e. $S \equiv U + cR$, where U and R are the number of unemployed and the number of workers on programmes, respectively. Search effectiveness is captured by the parameter c, where $0 \leq c \leq 1$. Since being on a programme is a full-time activity, programme participants search less intensively than the unemployed. Notice in this model that all unemployed workers exhibit the same search intensity. Thus we do not allow for the possibility that the unemployed may lower their search intensity with duration of unemployment[3]. We further assume that those in regular employment (E) do not search.

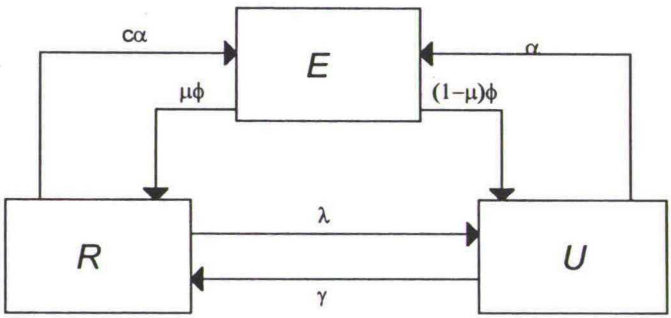
There are L individuals in the exogenously given labour force. The proportions of the workforce in regular employment, on labour market programmes, and in unemployment are given as $e \equiv E/L$, $r \equiv R/L$, and $u \equiv U/L$, respectively. Since the labour force comprises of those in regular employment, those on programmes, and those in unemployment, we have the following identity: $1 \equiv e + r + u$. The vacancy rate is given as $v \equiv V/L$, The variable $\theta \equiv V/S$ represents labour market tightness. The higher is θ, the

[3] In other more-realistic models, we do allow for this possibility. Here, however, we use this very simple model to illustrate how rejectable programmes can be used.

tighter is the labour market. $q \equiv H/V$ represents the rate at which vacant jobs are filled. By the constant returns to scale assumption, we have $q(\theta) \equiv h(S/V,1) = h(1/\theta,1)$, where $q'(\theta) < 0$. The flow of new hires into regular jobs is given as $H = \alpha S$, where $\alpha = (H/V)(V/S) = q(\theta)\theta$. We see that $\alpha'(\theta) > 0$ since $\alpha = \theta h(1/\theta,1)$; thus $\alpha = h(1,\theta)$, where $h(\cdot)$ is an increasing function.

Regular job offers arrive according to a Poisson process, with arrival rates that are exogenous to the individual worker. The arrival rate for an unemployed worker is α, whilst for a programme participant it is $c\alpha$. Therefore, the arrival rate is higher for an unemployed searcher than for a programme participant, providing those on programmes search less intensively than those in unemployment (i.e. if $c < 1$). The unemployed may also exit to programmes. Offers of places on programmes arrive according to a Poisson process with parameter γ. There is an exogenously given rate ϕ at which regular jobs break up, and a government-determined rate λ at which programmes expire. A worker separated from a regular job can enter onto a labour market programme with probability μ, or enter directly into unemployment with probability $(1-\mu)$. Programmes are considered to be temporary. Thus we assume that the rate at which programmes expire is strictly greater than the separation rate for regular jobs, i.e. $\lambda > \phi$. Figure 1 illustrates the model:

Figure 1



In Figure 1, the boxes E, R, and U, refer to the stocks of regular employment, programme participants, and unemployment, respectively, whilst the arrows represent the flows between the stocks. In the steady state, the numbers flowing into a given stock equal the numbers flowing out of the said stock. Thus we have the following steady-state equations for rates of regular employment and programme participation:

[1] $$\phi e = \alpha(\theta)u + c\alpha(\theta)(1 - e - u)$$

[2] $$\left[c\alpha(\theta) + \lambda\right](1 - e - u) = \gamma u + \mu\phi e$$

(From the identity $1 \equiv e + r + u$, we let $r \equiv 1 - e - u$ in the equations.)

Equations [1] and [2] determine u and e, given θ. In order to determine θ, we have to consider the determination of vacancies and wages. All regular jobs are equally productive. We assume that firms are small. Each firm has only one job which is either occupied or vacant. For the firm, an occupied job has an expected value of J_{o_r} if the worker entered from a programme, and J_{o_u} if the worker entered from unemployment. The expected value of a vacant job is J_v. The discount rate is denoted by δ, y is the constant marginal product, w_{c_r} is the wage cost to the firm of a worker who entered the job from a programme, w_{c_u} is the wage cost to the firm of a worker who entered the job from unemployment, and k is the cost of maintaining a vacancy. The wage rate is related to the wage cost via the identity $w_{c_{r,u}} \equiv w_{r,u}(1+t)$, where t is the payroll tax. In this paper, we treat the payroll tax as endogenous. How we do this will be explained in detail in Section 4. J_{o_r}, J_{o_u}, and J_v satisfy the following equations:

[3] $$\delta J_{o_r} = y - w_{c_r} + \phi(J_v - J_{o_r})$$

[4] $$\delta J_{o_u} = y - w_{c_u} + \phi(J_v - J_{o_u})$$

[5] $$\delta J_v = -k + q_r(J_{o_r} - J_v) + q_u(J_{o_u} - J_v)$$

where $q_r = \alpha\dfrac{cr}{v}$ and $q_u = \alpha\dfrac{u}{v}$.

A job occupied by a worker who entered the wage bargain from a programme yields a per-period surplus of $y - w_{c_r}$ and is turned into a vacant job at the rate ϕ; worker separations from this job are associated with a capital loss of $J_v - J_{o_r}$. A job occupied by a worker who entered the wage bargain from unemployment, on the other hand, yields a per-period surplus of $y - w_{c_u}$ and is turned into a vacant job at the rate ϕ; worker separations from this job are associated with a capital loss of $J_v - J_{o_u}$. The cost of a vacancy per period is *k*, and vacancies become occupied at the rate q_r by workers from programmes and q_u by workers from unemployment. Vacancies are kept open as long as their yield is positive. In equilibrium, due to the small firm assumption, $J_v = 0$. The value of a job occupied by a worker who entered from a programme is obtained from [3] as $J_{o_r} = \left(y - w_{c_r}\right)/(\delta + \phi)$, whilst the value of a job occupied by a worker who entered from unemployment is obtained from [4] as $J_{o_u} = \left(y - w_{c_u}\right)/(\delta + \phi)$. Substituting into [5] yields

[6] $$\frac{y - w_c}{\delta + \phi} = \frac{k}{q(\theta)}$$

where $w_c \equiv \left(uw_{c_u} + crw_{c_r}\right)/(u + cr)$ is the average wage cost in the economy, and $q(\theta) = q_r + q_u = \alpha\left((cr + u)/v\right)$ is the firm's average probability of finding a worker to fill a vacancy.

This is the average zero-profit condition for firms. The left-hand side is the average present value of profits per worker, whilst the right-hand side is the expected present value of the firm's hiring cost. Labour market tightness influences decisions on vacancies by affecting hiring costs; the tighter the labour market, the costlier it is to hire due to the longer duration of vacancies.

Wages are determined by a Nash bargain. The firm's disagreement point is the value of a vacant job; whilst the worker's threat point is either the expected lifetime value of being unemployed, if the worker is unemployed, or the expected lifetime value of being on a labour market programme, should the worker be on a programme. Since we assume that the wage bargains are undertaken between individual firms and individual workers, there are essentially two types of Nash bargain in the economy.

We let Λ_{e_r} and Λ_{e_u} denote expected discounted lifetime income for workers in regular employment who have entered their job from a programme and workers who have entered their job from unemployment, respectively. Λ_u denotes the value of unemployment, whilst Λ_r denotes the value of being on a programme. The value functions can be written as

[7] $$\delta\Lambda_{e_{ri}} = w_{r_i} + (1-\mu)\phi\left(\Lambda_u - \Lambda_{e_{ri}}\right) + \mu\phi\left(\Lambda_r - \Lambda_{e_{ri}}\right)$$

[8] $$\delta\Lambda_{e_{ui}} = w_{u_i} + (1-\mu)\phi\left(\Lambda_u - \Lambda_{e_{ui}}\right) + \mu\phi\left(\Lambda_r - \Lambda_{e_{ui}}\right)$$

[9] $$\delta\Lambda_r = \rho_r w + c\alpha\left(\Lambda_{e_r} - \Lambda_r\right) + \lambda\left(\Lambda_u - \Lambda_r\right)$$

[10] $$\delta\Lambda_u = \rho_u w + \alpha\left(\Lambda_{e_u} - \Lambda_u\right) + \gamma\left(\Lambda_r - \Lambda_u\right)$$

where $\Lambda_{e_r} = (1/\delta)\left[w_r + (1-\mu)\phi\left(\Lambda_u - \Lambda_{e_r}\right) + \mu\phi\left(\Lambda_r - \Lambda_{e_r}\right)\right]$ is the value to the worker of a job anywhere in the economy which was entered from a programme, whilst $\Lambda_{e_u} = (1/\delta)\left[w_u + (1-\mu)\phi\left(\Lambda_u - \Lambda_{e_u}\right) + \mu\phi\left(\Lambda_r - \Lambda_{e_u}\right)\right]$ is the value of a job anywhere in the economy which was entered from unemployment. w_r and w_u refer to the wages of workers in regular employment who entered the job from a programme and unemployment respectively, whilst w refers to the average wage in the economy. A worker employed by firm i receives the wage rate w_{r_i} if they entered the job from a programme, and w_{u_i} if they entered the job from unemployment. All workers are separated from their job at the rate ϕ. A worker exiting from their job has probability μ of entering a programme and probability $(1-\mu)$ of entering unemployment. Pay on programmes is linked to the average wage in the economy via the replacement ratio ρ_r, whilst unemployment benefits are linked to the average wage in the economy via the replacement ratio ρ_u.

The Nash bargain between a programme participant and the firm solves the following:

$$\max_{w_{r_i}} \Omega(w_{r_i}) \equiv \left[\Lambda_{e_{r_i}}(w_{r_i}) - \Lambda_r\right]^{\beta} \left[J_{o_{r_i}}(w_{r_i}) - J_v\right]^{1-\beta}$$

where $0 < \beta < 1$.

The outcome of the Nash bargain is a wage equation of the form

$$[11] \quad w_{c_r} = y - \left[\frac{1-\beta}{\beta}\right](1+t)(\delta+\phi)\left(\Lambda_{e_r} - \Lambda_r\right)$$

where the equilibrium conditions $w_{r_i} = w_r$ and $J_v = 0$ are imposed. For these workers, the outside option, should the wage bargain not result in employment, is the value of being on a programme, i.e. Λ_r. As can be seen, any policy that reduces the value difference, $\Lambda_{e_r} - \Lambda_r$, will increase w_{c_r}

The Nash bargain between an unemployed worker and the firm solves the following:

$$\max_{w_{u_i}} \Omega(w_{u_i}) \equiv \left[\Lambda_{e_{u_i}}(w_{u_i}) - \Lambda_u\right]^{\beta} \left[J_{o_{u_i}}(w_{u_i}) - J_v\right]^{1-\beta}$$

where $0 < \beta < 1$.

The outcome of the Nash bargain is a wage equation of the form

$$[12] \quad w_{c_u} = y - \left[\frac{1-\beta}{\beta}\right](1+t)(\delta+\phi)\left(\Lambda_{e_u} - \Lambda_u\right)$$

where the equilibrium conditions $w_{u_i} = w_u$ and $J_v = 0$ are imposed. For these workers, the outside option, should the wage bargain not result in employment, is the value of unemployment, i.e. Λ_u. Again, any policy that reduces the difference in value between working and the outside option, $\Lambda_{e_u} - \Lambda_u$, will increase the wage cost w_{c_u}.

We can combine these two wage equations to gain a wage-cost equation for the average wage in the economy. By weighting w_r by the proportion of searchers on programmes and w_u by the proportion of searchers in unemployment, we gain the following average wage-cost equation:

$$[13] \quad w_c = \frac{uw_{c_u} + crw_{c_r}}{u + cr} = y - \left[\frac{1-\beta}{\beta}\right](\delta + \phi)(1 + t)\left(\Lambda_e - \Lambda_{fb}\right)$$

where

$$[14] \quad \Lambda_e = \frac{u\Lambda_{e_u} + cr\Lambda_{e_r}}{u + cr} \quad \text{and}$$

$$[15] \quad \Lambda_{fb} = \frac{u\Lambda_u + cr\Lambda_r}{u + cr}.$$

Λ_e refers to the average value of being in regular employment, whilst Λ_{fb} is simply the average outside option available to workers involved in wage bargaining. In [14], Λ_{e_r} is weighted by the proportion of effective searchers who are on programmes. This is due to the fact that, in the steady state, the proportion of workers who enter regular employment from programmes is equal to the proportion of effective searchers who are programme participants. Similar reasoning holds for the weighting of Λ_{e_u}.

We can re-write the average difference in value between regular employment and the fall-back situation as $\Lambda_e - \Lambda_{fb} \equiv f(\cdot)w$ (see Appendix). Substituting this into [13] and using [6] to eliminate y gives us the following equilibrium average wage equation:

$$[16] \quad w_c = \frac{\beta k}{(1-\beta)q(\theta)f[\alpha(\theta);\ldots]}$$

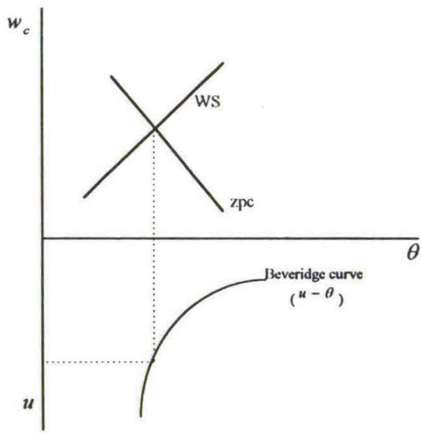
This equation determines the wage cost, given tightness. By expressing $\Lambda_e - \Lambda_{fb}$ as the average wage multiplied by $f(\cdot)$, we are able to gain an explicit expression for w_c in terms of β, k, $q(\theta)$, ρ_r, ρ_u, and the flow parameters of the model (see Appendix for further details). Note that α is the only flow parameter which is a function of θ.

Our model is now more or less complete; in the next section, we complete the model by making the budget constraint explicit. By seeing whether the system can provide all workers with the guarantee of benefits or a wage at or above the social minimum, we can see whether the system is workable or not.

The almost-complete model is given by the wage equation [16], the zero-profit condition [6], and the two steady-state equations [1] and [2]. [6] and [16] determine θ and w_c. By substituting θ into [1] and [2], we can determine u and e.

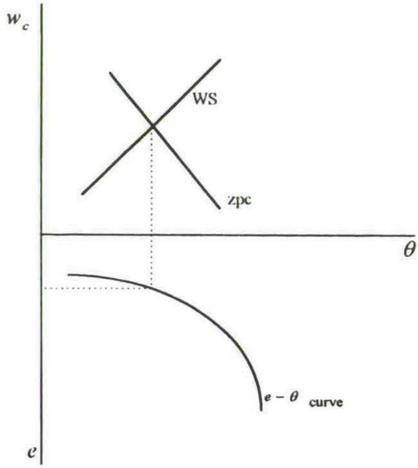
The model is illustrated in Figure 2, below. The top half shows the zero-profit condition [6] and the wage equation [16] in (w_c, θ) – space. The bottom half shows the "Beveridge curve", which shows the relationship between unemployment and tightness.

Figure 2



Alternatively, we can show the model with the $e-\theta$ curve, instead of the Beveridge curve, as shown in Figure 3 below. The $e-\theta$ curve is simply the relationship between regular employment and tightness. It is obtained by substituting out u from [1] and [2]. It allows us to see whether any crowding out occurs.

Figure 3



From Figures 2 and 3, it can be seen that the wage-setting curve slopes upwards. We can see from [16] that θ appears in the denominator in both q and the value difference. As θ increases, both q and $f(\cdot)$ (which is positively related to the value difference) fall; the result being that the average wage cost increases. The zero-profit condition on the other hand is negatively sloped. The reason for this is that the higher the average wage, the lower must be labour market tightness in order to yield zero profits (see Page 7).

The only curve which is unaffected by changes in any of the policy parameters is the zero-profit condition in the top half of the diagrams. Changes in either of the replacement ratios are reflected in a shift in the wage-setting curve, only. All other curves remain fixed. Thus a change in a replacement ratio results in a movement along the zero-profit curve, and thus movements along both the Beveridge curve and the $e-\theta$ curve. A change in a policy parameter which directly affects the stocks in the labour market shifts the wage-setting curve as well as the Beveridge curve and the $e-\theta$ curve. An increase in the flow onto labour market programmes causes the Beveridge curve and the $e-\theta$ curve to shift inwards towards the origin, and vice-versa.

As mentioned, whilst we are now in a position to see how the model looks, and what happens if curves shift in a particular direction, we are unable to see if the resulting equilibrium is able to offer all workers, whether working or not, the guarantee of either a wage at or above the minimum acceptable level, or benefits at or above the minimum acceptable level. The next section, therefore, shows how we have endogenised the payroll tax and how this allows us to see whether the resulting situation is workable or not.

3 Endogenisation of the payroll tax

In this paper, we endogenise the payroll tax. Whilst a change in the payroll tax does not alter unemployment, or even regular employment, it is still necessary to look at the payroll tax for other purposes. Primarily it is necessary to endogenise the payroll tax in order to check to see if the situation is workable, in that the outcome is socially acceptable. What this means is that the system is able to provide all workers outside of regular employment with the option of either taking unemployment benefits or pay on a labour market programme at or above the minimum level. (In an extreme situation, it may even be possible that workers in regular employment have a wage below the required minimum!)

We assume that in the steady state, government revenue from the payroll tax equals expenditure on both unemployment benefits and pay to those on labour market programmes. Thus we have $twe = \rho_r wr + \rho_u wu$. Simplification of this leaves us with the following expression for the payroll tax in the steady state:

[17] $$t = \frac{\rho_r r + \rho_u u}{e}$$

From [16], we see that $w = \beta k \big/ \left[(1-\beta)q(\theta)f\left[\alpha(\theta);\ldots\right](1+t)\right]$. Thus any increase in t will reduce the wage, possibly to below the minimum level. (Note that we are discussing the wage which the worker receives as opposed to the wage cost.) This itself, would ensure that the system is unworkable. As is clear, t is likely to increase should either ρ_r, r, ρ_u, or u increase or if e decreases. If any of these changes either reduces w to below the minimum level, or the welfare safety net when not working (i.e. $\rho_r w$ when places on labour market programmes are guaranteed to unemployed workers but their unemployment benefits are below the minimum level; or $\rho_u w$ when no programmes are available or when programmes are directed at the flow out of regular employment) to below the minimum level, then we consider the system to be an unworkable system.

Our model is now complete. Figures 2 and 3 show the salient features of the model, whilst the endogenisation of the payroll tax allows us to then check to see if an equilibrium is a workable equilibrium or not. The next section looks at the comparative statics of the model. This allows us to make predictions as to the likely direction of change in wages, as well as the rates of regular employment, programme participation, and unemployment.

4 Comparative statics[4]

The direct effect on unemployment of a change in either γ or μ is $u_\gamma < 0$ and $u_\mu < 0$, respectively. In Figure 2, this would be seen as an upward shift of the Beveridge curve. Thus for a given value of θ, unemployment will be lower. However, a change in a policy parameter will also have an indirect wage effect on unemployment. This effect will alter the value of θ. As $u_\theta < 0$, we would ideally like θ to increase as a result of the change in the policy parameter. Thus in Figure 2, we would prefer to see the wage curve shift downwards, resulting in an increase in θ. From [16], we see that any policy that increases f reduces the wage cost. This has the effect of increasing θ. Therefore, we see that a

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[4] Calculations can be seen in the Appendix.

change in a policy parameter influences the wage (and θ) according to the following relationship:

$$\text{sign } (-1)\frac{\partial\theta}{\partial x} = \text{sign}\frac{\partial w_c}{\partial x} = \text{sign } (-1)\frac{\partial f}{\partial x}$$

where x is a policy parameter. Policies which have a negative indirect effect on unemployment reinforce the direct negative effect on unemployment.

Since the value difference between regular employment and the fall-back position is reduced when we increase ρ_u, it is clear that $\partial f/\partial \rho_u < 0$. Thus, if we can reduce ρ_u, we can increase $f(\cdot)$ and thereby reduce the wage cost to firms. This in turn will increase the value of θ thus leading to an increased flow into regular employment. If we increase ρ_r, the value difference between regular employment and the average fall-back situation can either increase, decrease, or remain unchanged, depending on how programmes are targeted. Thus we have $\partial f/\partial \rho_r \div 0$.

If we increase the proportion of those exiting regular employment who enter labour market programmes, this can either increase, decrease, or leave unaltered, the value difference between regular employment and the average fall-back position. The reason for this is that whilst aiming programmes at the flow out of regular employment increases the value of regular employment to a greater extent than the value of being in unemployment, it also increases the value of being outside regular employment for some since it makes them programme participants with a higher present value of lifetime income. Thus we have $\partial f/\partial \mu \div 0$. As a result, θ can either increase, decrease, or remain unchanged with a change in μ.

Seeking to increase the number of unemployed workers entering labour market programmes, i.e. increasing γ, has the effect of increasing the present value of being in unemployment to a greater extent than the increase in the present value of regular employment. Coupled with this the fact that there are now more searchers on programmes than previously, and thus with higher present values, it is clear that the value difference between regular employment and the average fall-back position will decrease. Thus we have $\partial f/\partial\gamma < 0$. As a result, θ will certainly decrease when programme places are targeted at the unemployed.

With regard to regular employment, we find that the direct effect of an increase of the flow onto programmes is negative, i.e. we have $e_\gamma < 0$ and $e_\mu < 0$. This, coupled with the fact that $e_\theta > 0$ and that an increase in programme participation may in fact reduce θ, implies that the usage of programmes is extremely likely to crowd out regular employment.

The only policy which crowds in regular employment thereby reducing unemployment is the policy of reducing unemployment benefits. Whilst there is no direct effect on the labour market stocks, i.e. $\partial e/\partial p_u|_{\theta=\bar{\theta}} = 0$ and $\partial u/\partial p_u|_{\theta=\bar{\theta}} = 0$, the indirect effect on unemployment is unequivocally negative, and the indirect effect on regular employment is unequivocally positive, i.e. $(\partial e/\partial\theta)(\partial\theta/\partial p_u) > 0$ and $(\partial u/\partial\theta)(\partial\theta/\partial p_u) < 0$. So what stops us from using such a policy? Other papers have implicitly assumed that the level of benefits is already at its minimum level. If we consider benefits to be at their minimum level, the only way we can reduce them is to guarantee programmes to those who lose such benefits. Yet by now using such programmes, we run the risk of crowding out regular employment.

5 How to crowd in regular employment by using labour market programmes

As we have seen, the usage of labour market programmes is extremely likely to crowd out regular employment. So if using programmes is almost certain to crowd out regular employment, wouldn't it be undesirable to use them? Maybe; maybe not. Whilst so far the picture with regard to the possibility of crowding out has been grim, there is a way in which we can use labour market programmes and crowd *in* regular employment. One thing is absolutely clear in the model: by reducing unemployment benefits we can reduce unemployment and increase regular employment. So why don't we simply reduce unemployment benefits? An obvious reason for not reducing unemployment benefits is that they may already be at their minimum level. Since we have assumed that workers must have the availability of a welfare safety net when outside regular employment, we must consider the reduction of such benefits with caution. But couldn't we offer unemployed workers places on programmes with a rate of pay at or above the minimum level which are designed to give the worker a lower expected present value of lifetime income than if the worker were in unemployment, despite the fact that unemployment benefits are lower or possibly zero? By guaranteeing an unemployed worker a place on a programme, but ensuring that the said job is rejectable, we can cut unemployment benefits to below their minimum level *and* avoid the crowding out associated with the usage of programmes. The welfare safety net is still in place, but the unemployed worker declines it in favour of remaining unemployed with unemployment benefits below the minimum level. In fact, an unemployed worker may opt to remain unemployed with no benefits whatsoever, despite the fact that they are guaranteed a place on a programme!

How can this be so? Since an unemployed worker has a higher chance of gaining a regular job than a worker on a programme (providing that $c<1$), it may be in the interest of the worker to remain unemployed, foregoing earnings from programme participation, to maintain a maximum chance of gaining a regular job. The worker can thus achieve the highest expected lifetime income by remaining unemployed, and waiting until a regular job is obtained, despite the fact that unemployment benefits may be well below the socially acceptable minimum.

Essentially the result of this policy is two-fold: Firstly, the reduction in unemployment benefits increases the value difference between regular employment and unemployment, thus leading to a lower wage cost to firms. Lower wage costs induce firms to create more vacancies. As a result, θ increases which in turn causes α, the flow into regular employment, to increase. Secondly, it avoids unemployed workers, with a maximum search intensity, from entering programmes where the search intensity is very likely to be lower (i.e., when $c < 1$), due to having less time to search than if they remained in unemployment. Since the worker would rather be unemployed than on a programme, providing the lifetime income of being unemployed is higher than if they took a place on a programme, they choose unemployment so that they are able to search full time for regular employment.

Despite the fact that the policy solution which we offer has unequivocal results, it is enlightening to look at examples of such usage, particularly in relation to the use of programmes where the intention is that they be accepted, i.e. "acceptable" programmes. The following table shows some simulations undertaken which show the contrast between using rejectable and acceptable labour market programmes. The parameter values which we use are the same as those used by Holmlund & Lindén.

Table 1

	γ	μ	ρ_u	ρ_r	u	r	e	v	θ	w	t	w_c	A/R	Workable system?
Base run	0.0	0	0.5	–	5.0	0.0	95.0	2.0	0.39	100.0	2.6	100.0	–	✓
c=0	0.5	0	0.0	1.0	1.2	92.2	6.6	0.1	0.05	7.0	1391.6	101.4	*A*	✗
c=0	0.0	0	0.0	0.491	3.3	0	96.7	2.7	0.80	101.8	0	99.22	*R*	✓
c=0.5	0.5	0	0.0	0.507	0.2	6.2	93.6	2.5	0.76	98.6	3.4	99.29	*A*	✓
c=0.5	0.0	0	0.025	0.491	3.4	0	96.6	2.6	0.78	101.8	0.1	99.25	*R*	✓
c=1	0.5	0	0.0	0.5	0.2	4.8	95.0	2.0	0.40	100.1	2.5	99.99	*A*	✓
c=0	0.0	1	0.555	0.975	4.8	9.6	85.5	1.7	0.35	90.0	14.1	100.1	*A*	✓
c=0.5	0.0	1	0.514	0.75	2.4	5.1	92.5	1.9	0.38	97.3	5.5	100.0	*A*	✓
c=1	0.0	1	0.5	0.51	1.6	3.4	94.98	2.0	0.39	100.0	2.7	100.0	*A*	✓

The following parameter values hold in the table: $\lambda = 1/150$; $\phi = 0.00075$; $\delta = 0.05/365$; and $\beta = 0.546$. ***u***, ***r***, ***e***, and ***v*** all refer to percentages of the labour force. *w* and w_c are given as indices with both being set equal to 100 in the base run. *t* refers to the percentage rate of payroll tax. Following Holmlund & Lindén, we define the cost of maintaining a vacancy ***k***, as $k = w_c$, and the average probability of a firm filling a vacancy as $q = 0.025 \cdot \theta^{-0.4}$.

In Table 1, the base run describes the initial situation when labour market programmes are not available and the level of unemployment benefits is already at the minimum possible level. We consider this minimum level to be the absolute level of unemployment benefits in the base run. The second column from the right, "*A/R*", indicates whether programmes are acceptable (indicated by *A*) or rejectable (indicated by *R*). The column on the far right indicates whether the system is workable or not (a tick indicates yes; a cross indicates no). By workability, we refer to whether the system can maintain a welfare safety net at or above the minimum level (here, the safety net which was in force in the base run). This is where the endogenisation of the payroll tax comes into force. By using the definition of the payroll tax, we can see whether the system can support the welfare safety net required. Table 1 shows us the average wage (as opposed to the wage cost) which the worker receives in regular employment. As is clearly seen, this wage is reduced by an increase in the payroll tax. In one case, the wage is itself reduced below the minimum level of absolute benefit required in the base run! The following table shows us why, and if, the system is workable:

Table 2

	γ	μ	ρ_u	ρ_r	$\rho_u w$	$\rho_r w$	Workable?	*A/R*	Λ_e	Λ_r	Λ_u
Base run	0.0	0	0.5	–	50.0	–	✓	–	778716.5	767535.9	775103.4
c=0	0.5	0	0.0	1.0	0.0	7.0	✗	*A*	55111.2	55016.5	55002.4
c=0	0.0	0	0.0	0.49	0.0	50.0	✓	*R*	786313.8	773724.1	781418.8
c=0.5	0.5	0	0.0	0.51	0.0	50.0	✓	*A*	761751.4	757114.1	757103.3
c=0.5	0.0	0	0.03	0.49	2.5	50.0	✓	*R*	786160.9	781302.1	781319.0
c=1	0.5	0	0.0	0.5	0.0	50.0	✓	*A*	778933.1	775300.3	775194.0
c=0	0.0	1	0.56	0.98	50.0	87.8	✓	*A*	702214.1	699152.5	699114.5
c=0.5	0.0	1	0.51	0.75	50.0	73.0	✓	*A*	758469.2	755036.8	754961.4
c=1	0.0	1	0.5	0.51	50.0	50.0	✓	*A*	778595.2	775018.0	774944.3

As shown, acceptability may be just too expensive to maintain. For example, when $c = 0$ and labour market programmes are targeted at the unemployed (row 2, Tables 1 and 2), we find that acceptability requires that the average wage that the worker in regular employment receives falls heavily due to the need to finance labour market programmes. In fact, it falls far below the minimum level of benefits required! When $c = 0$ and we target programmes at the flow out of regular employment, we must still maintain unemployment benefits at or above the minimum absolute level since we are not guaranteeing unemployed workers a place on a programme. However, to do so requires a high replacement ratio for those on programmes which itself reduces regular employment (which, as can be seen from Table 1, has already been crowded out as a result of this policy) still further.

In our simulations the only time when using acceptable programmes works, i.e. fails to crowd out regular employment, is when $c = 1$. But in the simulation when $\mu = 1$, the value functions for both being on a programme and being in unemployment are the same value. Using the benefit of doubt, we have allowed this to be considered as a usage of acceptable programmes. But to really be certain of this we really require an explicit form for the worker's utility function. So this situation must be considered doubtful. In any case, $c = 1.0$ is an extreme example and does not appear to be indicative of the real world.

In the simulations where acceptability of programmes holds and where $c < 1$, we see from Table 1 that some crowding out of regular employment results. The extreme case is the simulation illustrated in row 2 of Tables 1 and 2. The regular employment rate is reduced from 95% to a mere 6.6%. As can be seen, this situation is unworkable. In row 4 of Tables 1 and 2, we see the result of a simulation where $c = 0.5$ and acceptability holds. Here, the regular employment rate has fallen from 95% to 93.6%. Not a substantial level of crowding out, but crowding out nonetheless. When we guarantee places on programmes to those flowing out of regular employment (rows 7, 8, and 9, in Tables 1 and 2), we see that when $c < 1$ and acceptability holds, crowding out is again the result.

Looking at the present value of expected lifetime income of being either employed in a regular job, on a programme, or in unemployment, in Table 2, we see that the only time when lifetime income rises substantially as a result of a policy change is when the resulting situation includes rejectable labour market programmes. This is in stark contrast to situations where $c < 1$ and acceptability holds: lifetime income falls for all groups.

6 Conclusion

As can be seen, the only usage of labour market programmes which enables us to crowd in regular employment in this model, is that of rejectable labour market programmes. By offering unemployed workers programmes which they reject in favour of remaining unemployed, on reduced benefits due to their refusal of an offer of a place on a programme, we are able to shift the wage-setting curve downwards resulting in an increase of the flow into regular employment. Despite the fact that we now offer workers unemployment benefits below the minimum level, the welfare safety net is still in place. Workers do not have to face the prospect of poverty. Workers, seeing that it is in their interest to remain (or become) unemployed, rather than to join a labour market programme, will take the appropriate action when employed[5] and plan for any possible periods when unemployed. Indeed, both the rejectable programme solutions increase the expected lifetime income of those in unemployment in comparison to those in unemployment in the base run. Furthermore, the rejectable programme solutions also increase the lifetime incomes of those in regular employment in comparison to those in regular employment in the base run (see Table 2 for details).

Thus the only method of programme usage which leads to a crowding in of regular employment, is that usage which itself is dormant but allows for a tightening of the unemployment benefit system. This tightening of the unemployment benefit system is the only way to crowd in regular employment. To guarantee a crowding in of regular employment, labour market programmes must be used in such a way that their direct effect on employment and unemployment is non-operational and only their quasi-indirect effect, through reducing unemployment benefits, is operational.

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[5] In the short-run, i.e. between the steady-state solutions, it may well be the case that workers will take places on labour market programmes due to being liquidity-constrained. An analysis of the dynamics between the steady states is on our agenda.

7 Bibliography

Diamond, P. (1981), "Mobility Costs, Frictional Unemployment, and Efficiency.", *Journal of Political Economy*, 89, pp. 798-812.

Holmlund B. & J. Lindén (1993), "Job Matching, Temporary Public Employment, and Equilibrium Unemployment.", *Journal of Public Economics*, Vol. 51, pp. 329-343.

Layard, Nickell, & Jackman (1991), "Unemployment: Macroeconomic Performance and the Labour Market.", Oxford University Press, Oxford.

Miller J. (1995a), "A Comment on Holmlund & Linden's 'Job Matching, Temporary Public Employment, and Unemployment' ", *CentER Discussion Paper*, Tilburg University.

Miller J. (1995b), "Do Labour Market Programmes Necessarily Crowd Out Regular Employment? – A Matching Model Analysis.", Mimeo, Tilburg University.

Miller J. (1995c), "The Effects of Labour Market Policies When There is a Loss of Skill During Unemployment.", Mimeo, Tilburg University.

Miller J. (1993), "The Layard-Nickell Model: Can It Explain Unemployment in a Modern Context?", Mimeo, Uppsala University.

Miller J. (1991), "To What Extent Have Active Labour Market Policies in Sweden Reduced the NAIRU?", Unpublished undergraduate dissertation, Cambridge University.

Mortensen, D. (1982), "The Matching Process as a Non-Cooperative Bargaining Game.", in J. J. McCall (Ed), "The Economics of Information and Uncertainty.", University of Chicago Press, Chicago.

Pissarides, C. (1985), "Taxes, Subsidies, and Equilibrium Unemployment.", *Review of Economic Studies*, 52, pp. 121-33.

Pissarides, C. (1990), "Equilibrium Unemployment Theory.", Basil Blackwell, Oxford..

8 Appendix

From equations (1) and (2), and the identity $1 \equiv e + r + u$, we gain the following steady-state equations for regular employment, labour market programmes, and unemployment:

[A1] $$e = \frac{\alpha(c\alpha + c\gamma + \lambda)}{\left[(c\alpha + \mu\phi + \lambda)(1-c)\alpha + (c\alpha + \phi)(c\alpha + \gamma + \lambda)\right]}$$

[A2] $$u = \frac{\phi\left[c\alpha(1-\mu) + \lambda\right]}{(1-c)\alpha\mu\phi + \alpha(c\alpha + c\gamma + \lambda) + \phi(c\alpha + \gamma + \lambda)} \equiv \frac{A}{V}$$

[A3] $$r = \frac{\phi(\gamma + \mu\alpha)}{(1-c)\alpha\mu\phi + \alpha(c\alpha + c\gamma + \lambda) + \phi(c\alpha + \gamma + \lambda)} \equiv \frac{B}{V}$$

Differentiating [A1] with respect to γ and μ, we find that

$$\left.\frac{\partial e}{\partial \gamma}\right|_{\theta=\bar{\theta}} = -\frac{(1-c)\alpha}{V} \cdot u \le 0 \quad \text{and} \quad \left.\frac{\partial e}{\partial \mu}\right|_{\theta=\bar{\theta}} = -\frac{(1-c)\alpha\phi}{V} \cdot e \le 0$$

These differentials refer to the direct effect of a policy change, i.e. the effect of a policy change on regular employment when θ is fixed. Notice that ρ_u does not appear in the steady-state value of regular employment. Thus the direct effect of a change in ρ_u on regular employment is zero, i.e. $\left.\frac{\partial e}{\partial \rho_u}\right|_{\theta=\bar{\theta}} = 0$.

Differentiating [A1] with respect to α, we gain the following:

$$\frac{\partial e}{\partial \alpha} = \frac{c\alpha^2\mu\phi(1-c) + \phi(\gamma+\lambda)(c\alpha + c\gamma + \lambda) + c\alpha\phi(c\alpha + \gamma + \lambda)}{\left[(c\alpha + \mu\phi + \lambda)(1-c)\alpha + (c\alpha + \phi)(c\alpha + \gamma + \lambda)\right]^2} > 0$$

Since $\alpha'(\theta) > 0$, this implies that $\boxed{\frac{\partial e}{\partial \theta} > 0}$

Differentiating [A2] with respect to γ and μ, we find that

$$\left.\frac{\partial u}{\partial \gamma}\right|_{\theta=\bar{\theta}} = -\frac{(1-c)\alpha\phi}{V} \cdot u \le 0 \quad \text{and} \quad \left.\frac{\partial u}{\partial \mu}\right|_{\theta=\bar{\theta}} = -\frac{\phi(c\alpha + \phi)}{V} \cdot e \le 0$$

Similar to regular employment we find that a change in ρ_u does not have a direct effect on unemployment: $\left.\frac{\partial u}{\partial \rho_u}\right|_{\theta=\bar{\theta}} = 0$.

Differentiating [A2] with respect to α, we gain the following:

$$\frac{\partial u}{\partial \alpha} = -\frac{\phi}{V^2}\left[c\gamma\{\lambda-(1-\mu)\phi\} + c^2\alpha^2(1-\mu) + \lambda(c\alpha+\mu\phi+\lambda)\right] < 0$$

Since $\alpha'(\theta) > 0$, this implies that $\boxed{\frac{\partial u}{\partial \theta} < 0}$

We find the average value difference between regular employment and the fall-back position as follows:

[A4] $$\Lambda_e - \Lambda_{fb} \equiv \frac{u\Lambda_{e_u} + cr\Lambda_{e_r}}{u+cr} - \frac{u\Lambda_u + cr\Lambda_r}{u+cr}$$

[A5] $$\Lambda_e - \Lambda_{fb} \equiv \frac{[c\alpha(1-\mu)+\lambda](\Lambda_{e_u} - \Lambda_u) + c(\gamma+\mu\alpha)(\Lambda_{e_r} - \Lambda_r)}{c\alpha + c\gamma + \lambda}$$

[A6] $$\Lambda_e - \Lambda_{fb} = \Lambda_e - \frac{u\Lambda_u + cr\Lambda_r}{u+cr} = \frac{u(\Lambda_e - \Lambda_u) + cr(\Lambda_e - \Lambda_r)}{cr+u}$$

We invoke the following equations:

(7) $$\delta\Lambda_{e_{r_i}} = w_{r_i} + (1-\mu)\phi(\Lambda_u - \Lambda_{e_{r_i}}) + \mu\phi(\Lambda_r - \Lambda_{e_{r_i}})$$

(8) $$\delta\Lambda_{e_{u_i}} = w_{u_i} + (1-\mu)\phi(\Lambda_u - \Lambda_{e_{u_i}}) + \mu\phi(\Lambda_r - \Lambda_{e_{u_i}})$$

(9) $$\delta\Lambda_r = \rho_r w + c\alpha(\Lambda_{e_r} - \Lambda_r) + \lambda(\Lambda_u - \Lambda_r)$$

(10) $$\delta\Lambda_u = \rho_u w + \alpha(\Lambda_{e_u} - \Lambda_u) + \gamma(\Lambda_r - \Lambda_u)$$

Invoking the equilibrium condition that $w_{r_i} = w_r$ and $w_{u_i} = w_u$, and subtracting (8) from (7) yields the following:

$$w_r - w_u = (\delta+\phi)(\Lambda_{e_r} - \Lambda_{e_u})$$

Subtracting (12) from (11) yields the following:

(11) - (12) $\Rightarrow$ [A7] $w_r - w_u = \left[\frac{1-\beta}{\beta}\right](\delta+\phi)\left[\left(\Lambda_{e_u} - \Lambda_u\right) - \left(\Lambda_{e_r} - \Lambda_r\right)\right]$

Together these imply the following:

$$\Lambda_{e_r} - \Lambda_{e_u} - (1-\beta)\Lambda_r + (1-\beta)\Lambda_u = 0$$

The identity which gives us the average present value to the worker of being in regular employment (14) implies the following:

[A8] $$(c\alpha + c\gamma + \lambda)\Lambda_r - c(\gamma + \mu\alpha)\Lambda_{e_r} - \left[c\alpha(1-\mu) + \lambda\right]\Lambda_{e_u} = 0$$

Using [A7], [A8], and the following equations

$$(\delta+\phi)\Lambda_e = w + (1-\mu)\phi\Lambda_u + \mu\phi\Lambda_r$$

$$(\delta + c\alpha + \lambda)\Lambda_r = \rho_r w + c\alpha\Lambda_{e_r} + \lambda\Lambda_u$$

$$(\delta + \alpha + \gamma)\Lambda_u = \rho_u w + \alpha\Lambda_{e_u} + \gamma\Lambda_r$$

allows us to find explicit expressions for $\Lambda_e - \Lambda_u$ and $\Lambda_e - \Lambda_r$.

We let $\Lambda_e - \Lambda_u \equiv \frac{A}{V}$ and $\Lambda_e - \Lambda_r \equiv \frac{B}{V}$

where

$$V \equiv (\delta+\phi)\mathrm{Z} - \mu\phi\alpha(c\alpha + c\gamma + \lambda)\delta(1-c) + \alpha\phi\left[c(\gamma + \alpha\beta) + \delta + \lambda\right]$$

$$\begin{aligned}\mathrm{Z} \equiv\ & c\alpha\left\{c\alpha(1-\mu) + \lambda\right\}(1-\beta)(\delta+\alpha) + \lambda\left\{(c\alpha + c\gamma + \lambda)\gamma - c\alpha(\gamma + \mu\alpha)(1-\beta)\right\}\\ & + (\delta + c\alpha + \lambda)\left\{c\alpha(\gamma + \mu\alpha)(1-\beta) - (\delta + \alpha + \gamma)(c\alpha + c\gamma + \lambda)\right\}\end{aligned}$$

$$\begin{aligned}A \equiv\ & \phi\left[c\alpha(1-\mu) + \lambda\right]\delta(c\alpha\beta + \lambda + \delta + \gamma) + c\phi(\gamma + \mu\alpha)\delta(\delta + \gamma + \alpha\beta + c\alpha + \lambda - \alpha)\\ & + \mu\phi\left[\Psi + \Xi\right] + (1-\mu)\phi\mathrm{N} - (\delta+\phi)\Phi\end{aligned}$$

and

$$\Psi \equiv \rho_r c\phi(\gamma + \mu\alpha)(\delta + \gamma + \alpha\beta) + \rho_r(\delta+\gamma)\phi\left[c\alpha(1-\mu) + \lambda\right]$$

$$\Xi \equiv c\alpha\beta\rho_u\phi\left[c\alpha(1-\mu) + \lambda\right] + \lambda\rho_u(c\alpha + c\gamma + \lambda) - \alpha c\phi(\gamma + \mu\alpha)(\rho_r - c\rho_u)$$

$$\begin{aligned}\mathrm{N} \equiv\ & \rho_r(c\alpha + c\gamma + \lambda)\gamma + c\alpha\beta\phi\left[(\gamma + \mu\alpha)\rho_r + \left\{c\alpha(1-\mu) + \lambda\right\}\rho_u\right] - c\alpha(\gamma + \mu\alpha)\rho_r\\ & + (\delta + \lambda)\rho_u(c\alpha + c\gamma + \lambda) + c\alpha\rho_u c(\gamma + \mu\alpha)\end{aligned}$$

$$\Phi \equiv -c\alpha\phi\left[c\alpha(1-\mu)+\lambda\right]\rho_u(1-\beta)+(\delta+c\alpha+\lambda)\rho_u\phi(c\alpha+c\gamma+\lambda)$$
$$-\rho_r\left\{\alpha c\phi(\gamma+\mu\alpha)-\gamma\phi(c\alpha+c\gamma+\lambda)\right\}$$

$$B \equiv \phi\left[c\alpha(1-\mu)+\lambda\right]\delta\left[c\alpha\beta+\lambda+\delta+\gamma+(1-c)\alpha\right]+c\phi(\gamma+\mu\alpha)\delta(\delta+\gamma+\alpha\beta+\lambda)$$
$$+(1-\mu)\phi\delta\phi(c\alpha+c\gamma+\lambda)(\rho_u-\rho_r)$$
$$+\mu\phi\left[\rho_r c\phi(\gamma+\mu\alpha)(\delta+\gamma+\alpha\beta)+\left\{\rho_r(\delta+\gamma)+\alpha(\rho_r-c\rho_u)+c\alpha\beta\rho_u\right\}\phi\left[c\alpha(1-\mu)+\lambda\right]+\lambda\rho_u\phi(c\alpha+c\gamma+\lambda)\right]$$

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